



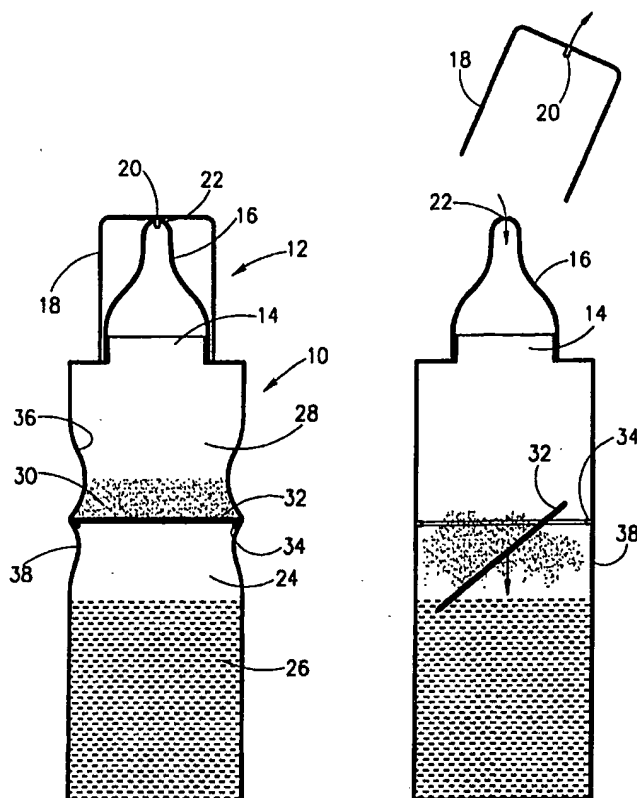
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(54) Title: CONTAINER FOR STORING, MIXING AND DISPENSING FORMULATIONS

(57) Abstract

A container is provided having two compartments (24, 28), each holding and storing one component of a formulation. The two compartments are separated with a partition (32) which can be removed or opened by the user. Within compartment (24 and 28) there is a vacuum and accordingly the flexible portion (38) is deformed from its rest state into the collapsed position as shown in Fig. 1, whereby it engages the rim of partition (32). When the cap is removed, as can be seen in Fig. 2, air can seep in through opening (32) in nipple (16) whereby the pressure inside the container increases so as to be equal to the external pressure and consequently the flexible portion (38) reforms to its original cylindrical state, disengaging partition (32) which then falls to the bottom of the container. This allows mixture of the two components.



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CONTAINER FOR STORING, MIXING AND DISPENSING FORMULATIONS

FIELD OF THE INVENTION

The present invention relates to a container for dispensing formulations, typically liquid formulations. An example of such a container is a baby's feeding bottle, a container for dispensing a liquid medicinal
5 formulation, or the like.

BACKGROUND OF THE INVENTION

Many formulations, particularly such which are dispensed in a liquid form, have to be prepared shortly before their use. One example is
10 a nutritional formulation for feeding babies which is typically prepared from a powder and water and which has to be mixed shortly before use, as prolonged storage of the prepared formulation will cause spoiling thereof. Another example is a liquid medicinal formulation which is prepared from a dry medicinal powder and water, which also has to be prepared shortly
15 before use since once in a liquid form, the activity of the medicinal compound diminishes with time. A standard requirement for many such formulations, e.g. babies' feed or medicinal formulations, is to maintain sterilization.

Containers which *a priori* have two compartments, each holding
20 one component of the formulation, in which are mixed upon removal or piercing of a partition between the two compartments are known. Reference is made in this connection to U.S. Patents 2,371,774, 2,533,806, 2,781,141, 3,305,368, 3,240,403, 3,458,076, 3,720,522, 3,779,372, 4,114,784, 4,221,291, 5,275,298, 5,456,929, 5,514,394 and 5,529,794.

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GENERAL DESCRIPTION OF THE INVENTION

It is an object of the invention to provide a novel multi-compartment container, wherein each compartment contains one component of a formulation, wherein the contents of the two compartments are mixed
5 prior to use.

The present invention provides, by a first of its aspects, a container having at least two compartments, each holding one component of a formulation, the container having one outlet for dispensing the formulation which is initially sealed, the component in each compartment is in a vacuum
10 and the compartments being separated from one another by a partition, the arrangement being such that upon opening of the outlet and release of the vacuum, the partitions open allowing mixing of the components to obtain said formulation.

In accordance with one embodiment of a said first aspect, said
15 partition is made of a rigid material, said container comprises at least a portion having walls made of flexible material, said partition being retained in a sealing engagement by said at least portion as long as there is a vacuum within the container, and once the vacuum is released, said at least portion deforms whereby it disengages said partition.

20 In accordance with another embodiment of said first aspect, said partition is made of a tearable material which is torn upon the application of a tearing force, opening of the outlet giving rise to a pressure differential between two adjacent compartments, said pressure differential creating a force exceeding said tearing force.

25 The present invention provides, by a second of its aspects, a container having at least two separate compartments, each holding one component of a formulation, the container having one outlet for dispensing the formulation, the at least two compartments being separated from one another by a piercable partition, the container having a piercing member for
30 piercing said partition.

The container according to one embodiment of said second aspect, comprises at least two sub-units, each of which defines one of said at least

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two compartments, each sub-unit being engageable with one other sub-unit, one of the engaging units having an integral piercing member, there being two engagement states, one being a storage state and the other being a piercing state in which said piercing member pierces said partition.

5 In accordance with another preferred embodiment, the components in the compartments are stored under vacuum.

The invention will now be illustrated, by way of example only, with reference to some non-limiting specific embodiments, with occasional reference to the annexed drawings.

10

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a longitudinal cross-sectional view through a baby's feeding bottle in accordance with the first aspect of the invention, in a storage state;

15 Fig. 2 shows the bottle of Fig. 1 after removal of the cap and release of the vacuum;

Fig. 3 shows sequences in the production of the bottle of Fig. 1;

Fig. 4 is a longitudinal section through another embodiment of a baby's feeding bottle in accordance with the first aspect of the invention, in a stored state;

20 Fig. 5 shows two sequences in breaking of the partition upon removal of the cap and releasing of the vacuum:

Fig. 5A demonstrates the build up of the pressure differential and deformation of the sealing partition;

Fig. 5B shows rupture of the partition;

25 Fig. 6 is an isometric exploded view of a baby's feeding bottle in accordance with the second aspect of the invention;

Fig. 7 shows the bottle of Fig. 6 in an assembled state;

Fig. 8 is an isometric exploded view of a baby's feeding bottle in accordance with another embodiment of said second aspect;

30 Fig. 9 shows the baby's feeding bottle of Fig. 8 in an assembled state.

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DESCRIPTION OF SPECIFIC EMBODIMENTS

In the following, the invention will be illustrated with reference to specific embodiments concerned with babies' feeding bottles. It will be appreciated to the artisan that this is an example only and the similar principle may also be used in different containers, e.g. containers for
5 dispensing medicinal formulations.

Reference is first being made to Fig. 1 showing a baby's feeding bottle generally designated 10 having a dispensing end 12 comprising an opening 14 fitted with a nipple 16. The bottle is sealed by a cap 18 having
10 a protrusion 20 projecting downward into an sealing opening 22 of nipple 16. The attachment of nipple 16 to opening 14 is as known *per se*.

The bottle 10 comprises two compartments of which a bottom compartment 24 contains a sterilized water 26 and a top compartment 28 containing a powdered nutritional composition 30. The two compartments
15 are separated from one another by means of a rigid partition 32 fixed on top of a circumferential annular shoulder 34 protruding inwardly from walls 36 of bottle 10. The central portion 38 of walls 36 is made of a flexible material.

Within compartments 24 and 28 there is a vacuum and accordingly the flexible portion 28 is deformed from its rest state into the collapsed position as shown in Fig. 1, whereby it engages the rim of
20 partition 32.

When the cap is removed, as can be seen in Fig. 2, air can seep in through opening 32 in nipple 16 whereby the pressure inside the container increases so as to be equal to the external pressure and consequently the
25 flexible portion 38 reforms to its original cylindrical state, disengaging partition 32 which then falls to the bottom of the container. This allows mixture of the powdered baby feed 30 and water 26. Following mixture, the bottle 10 is ready for use in baby's feeding and may be disposed after use.
30 Although it is theoretically possible to recycle the bottle for further use, it is preferably disposable, intended for a single use.

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Reference is now being made to Fig. 3 showing the manner of production of a container such as that shown in Figs. 1 and 2. In an initial stage (Fig. 3A) liquid 26 is introduced into the container via nozzle 44. At a next stage, shown in Fig. 3B, the partition, which is made of flexible material, which is bent to allow its entry through opening 14, is introduced into the container. Once inside the container, as can be seen in Fig. 3C, it comes to rest onto the circumferential annular shoulder 34. The sequences shown in Figs. 3B and 3C are performed all under vacuum.

At the next stage (Fig 3D) the vacuum is slightly released whereby the flexible portion 38 of wall 36 deforms and collapses so as to engage the rim of partition 32. At the next stage (Fig. 3E) the powdered baby feed 30 is introduced to the bottle through nozzle 46 and thereafter, as can be seen in Fig. 3F, the nipple 16 and cap 18 are added and then upon release of the vacuum, the bottle assumes the form as shown in Fig. 1.

Reference is now being made to Fig. 4 showing a baby's feeding bottle according to another embodiment of the first aspect. In this embodiment, the bottle generally designated 50 comprises an upper portion 52 defining an upper compartment 54 and a lower portion 56 defining a lower compartment 58. The two portions are separated from one another by a partition member 60 (which may be similar to partition member 74 of the embodiment shown in Figs. 6 and 7). The engaging member 60 is fitted with a stretched tearable partition 62. Partition 62 is torn upon the application of a tearing force.

Similarly as in the embodiment of Figs. 1-3, the lower compartment 58 holds sterilized water 64 and the upper compartment 54 holds a powdered feed composition 65, both compartments holding a vacuum. Furthermore, the upper compartment has an opening 66 fitted with a nipple 67 and a sealing cap 68. The nipple has a small feeding opening 69 at its top.

Upon removal of the cap 68, as shown in Fig. 5A, air seeps into compartment 54 increasing the pressure in that compartment and as a result

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of the pressure differential between it and compartment 58 the tearable partition 62 is pushed downward and when the pressure rises to a certain degree, the force across the partition reaches said tearable force and the partition tears as can be seen in Fig. 5B. Consequently, the two components, namely the powdered baby feed 68 and water 66, mix with one another.

Bottle 50, similarly to bottle 10 in Figs. 1 and 2, is preferably disposable although it is also herein in principle possible to recycle it for further use, e.g. by replacing the partition member 60. (The same holds also for the embodiments described below).

Reference is now being made to Figs. 6 and 7 illustrating an embodiment of a baby feeding bottle in accordance with the second aspect of the invention. Bottle 70 is composed of three individual components, these being a bottom member 72, a partition member 74 holding a stretched partition 75 and a top member 76. Bottom member 72 holds sterilized water (not shown) and top member 76 holds powdered baby feed formulation. As can be seen, top portion 76 has a nipple 78 and a sealing cap 80. Furthermore, top portion 76 has a downward projecting annular tearing member 84.

In accordance with this embodiment, the three components fit by means of a screw engagement with one another. Under storage, the top member 76 is not completely screw-fitted and tearing member remains removed from partition 75; prior to use, all members are tightly screwed together whereby the tearing member 84 ruptures partition 75 allowing the powdered material to mix with the liquid.

It will be appreciated, that a bottle of this kind may also have a safety device, e.g. a safety band 88 which ensures no accidental rupture of partition 75.

Reference is now being made to Fig. 8 which is very similar to the embodiment shown in Fig. 7 and accordingly like elements having given like numbers to those of the embodiment of Figs. 6 and 7. The difference here is that tearing member 90 is provided on the bottom member 72.

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Otherwise the use and operation of the feeding bottle according to this embodiment is identical to that of Figs. 6 and 7.

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CLAIMS:

1. A container having at least two compartments, each holding one component of a formulation, the container having one outlet for dispensing the formulation which is initially sealed, the component in each compartment is in a vacuum and the compartments being separated from one another by a partition, the arrangement being such that upon opening of the outlet and release of the vacuum, the partitions open allowing mixing of the components to obtain said formulation.
2. A container according to Claim 1, wherein said partition is made of a rigid material, said container comprises at least a portion having walls made of flexible material, said partition being retained in a sealing engagement by said at least portion as long as there is a vacuum within the container, and once the vacuum is released, said at least portion deforms whereby it disengages said partition.
3. A container according to Claim 1, wherein said partition is made of a tearable material which is torn upon the application of a tearing force, opening of the outlet giving rise to a pressure differential between two adjacent compartments, said pressure differential creating a force exceeding said tearing force.
4. A container having at least two separate compartments, each holding one component of a formulation, the container having one outlet for dispensing the formulation, the at least two compartments being separated from one another by a piercable partition, the container having a piercing member for piercing said partition.
5. A container according to Claim 4, comprising at least two sub-units, each of which defines one of said at least two compartments, each sub-unit being engageable with one other sub-unit, one of the engaging units having an integral piercing member, there being two engagement states, one being a storage state and the other being a piercing state in which said piercing member pierces said partition.

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6. A container according to Claim 4 or 5, wherein the at least two compartments hold a vacuum.
7. A container according to any one of the previous claims, being a baby's feed bottle.

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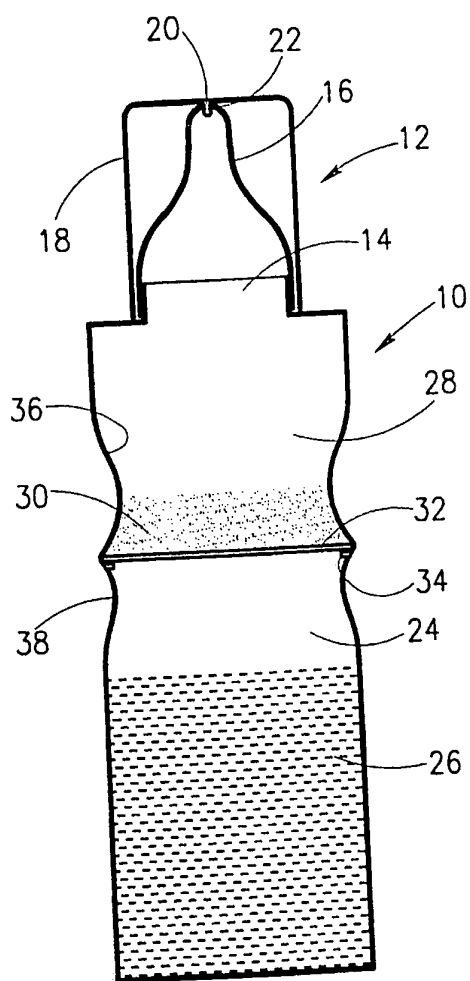


FIG. 1

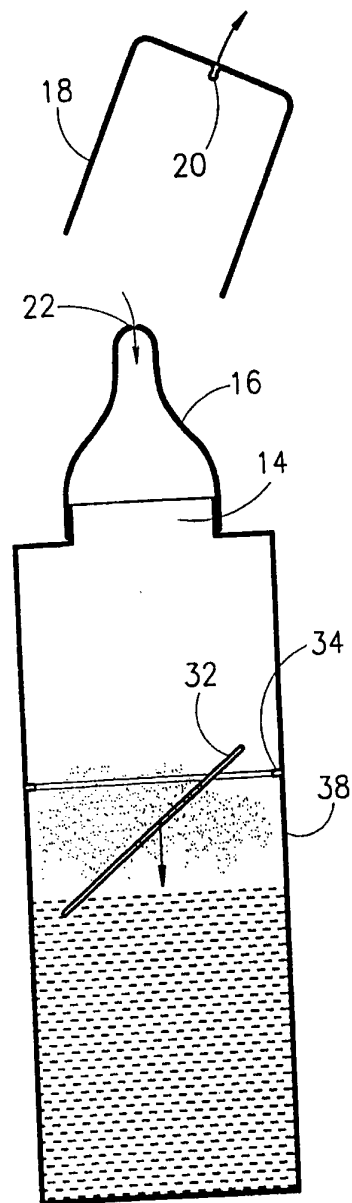
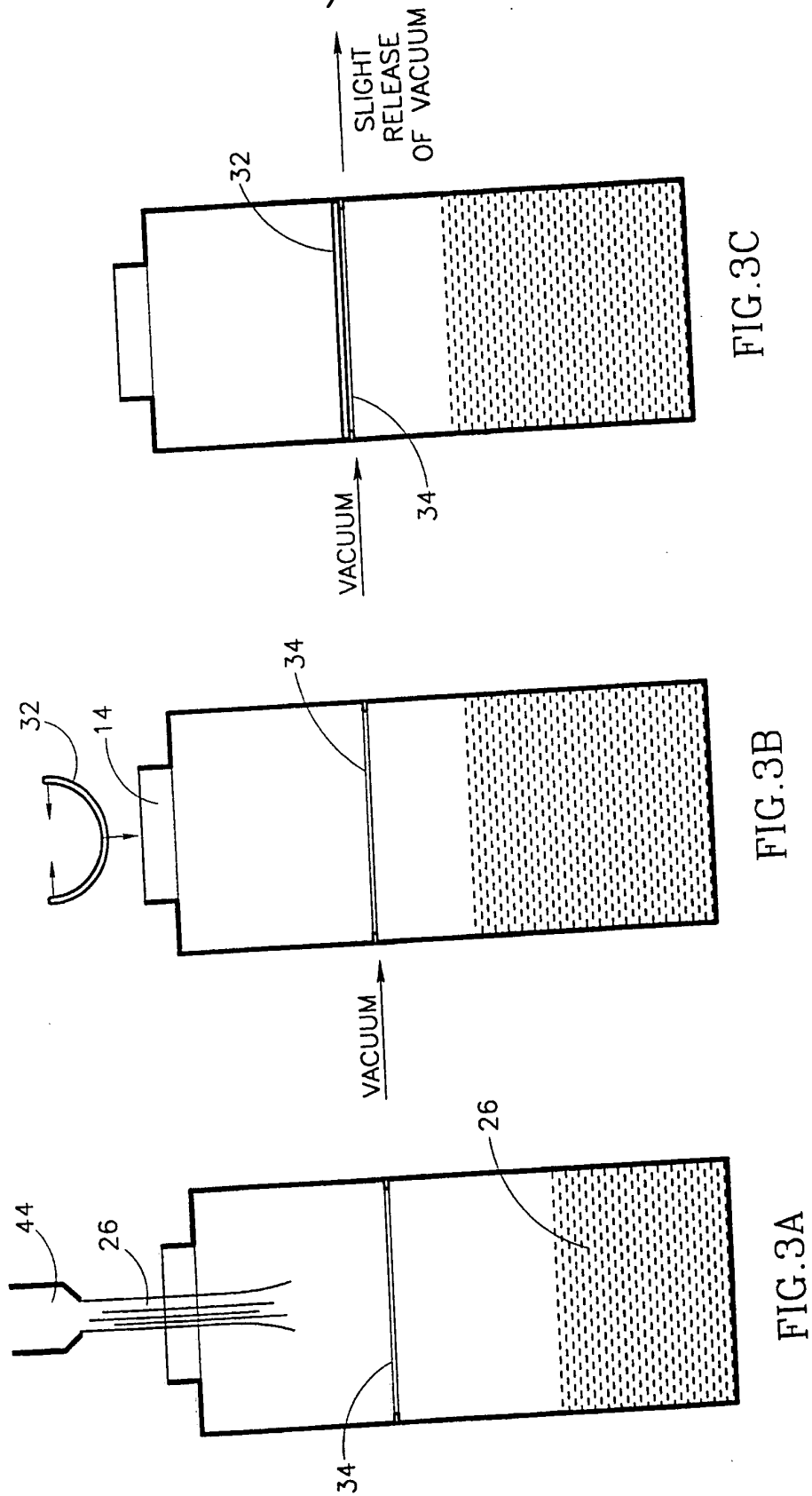
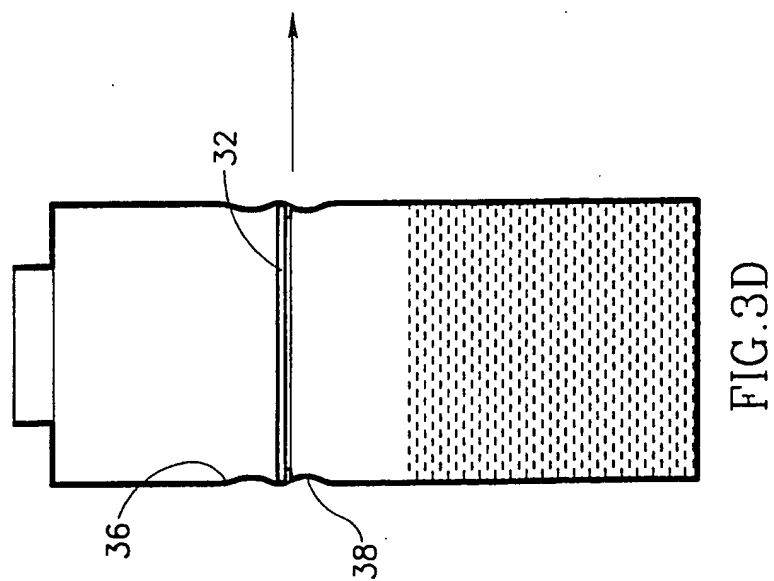
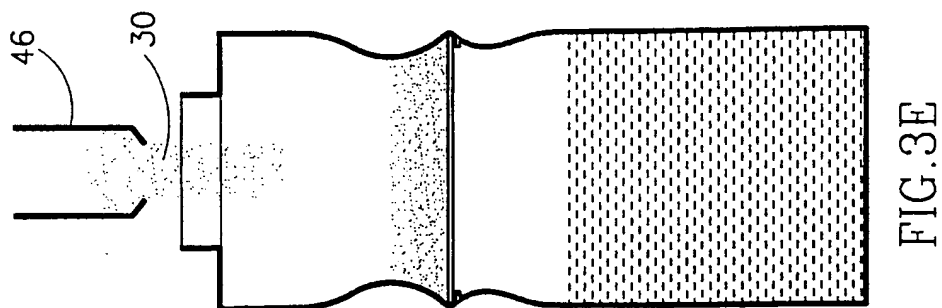
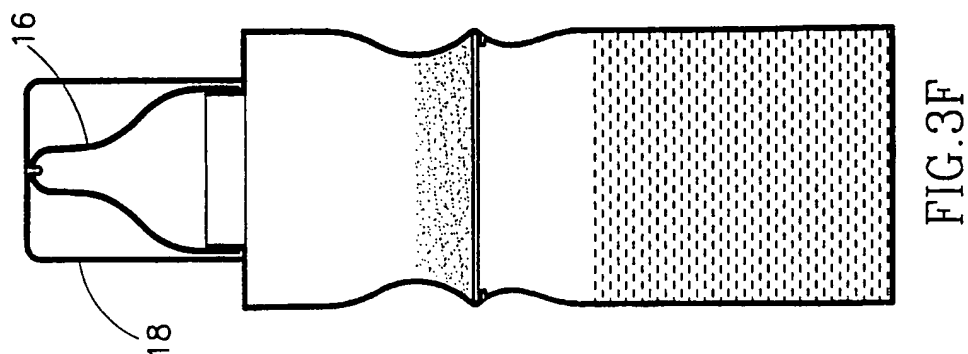


FIG. 2

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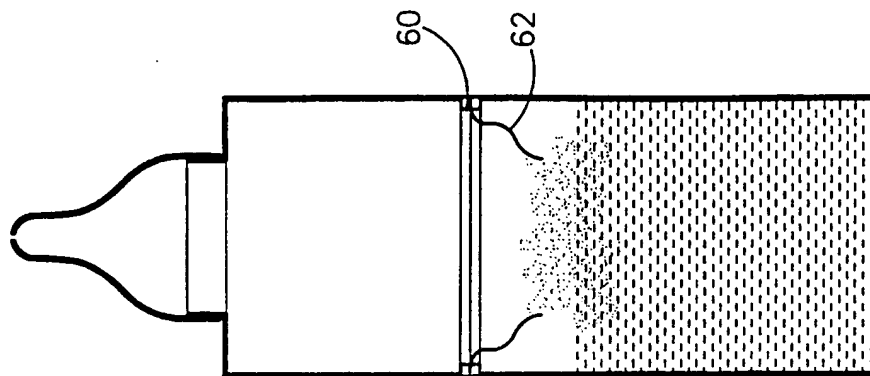


FIG. 5B

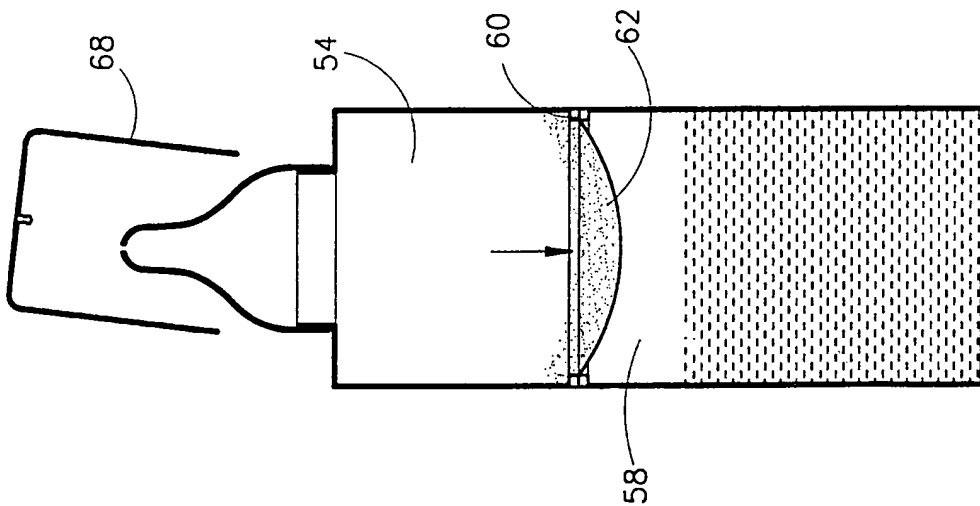


FIG. 5A

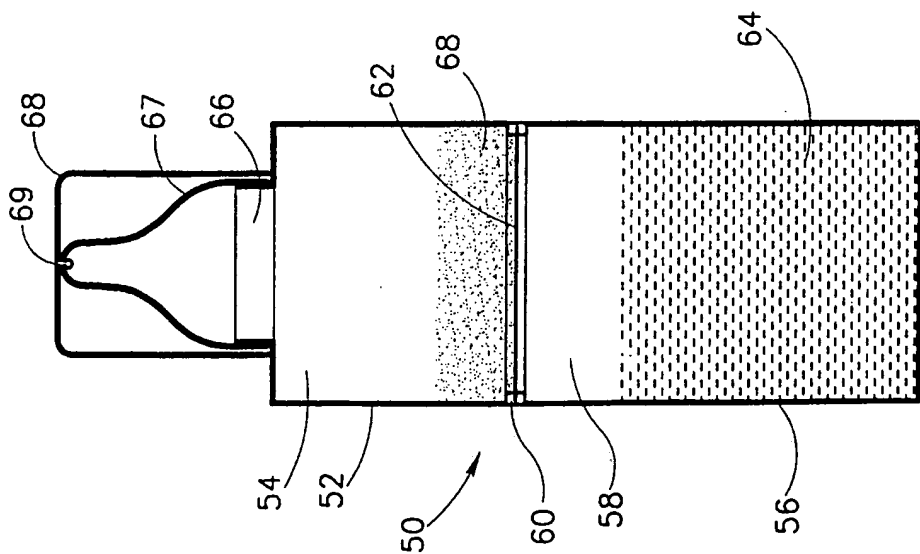


FIG. 4

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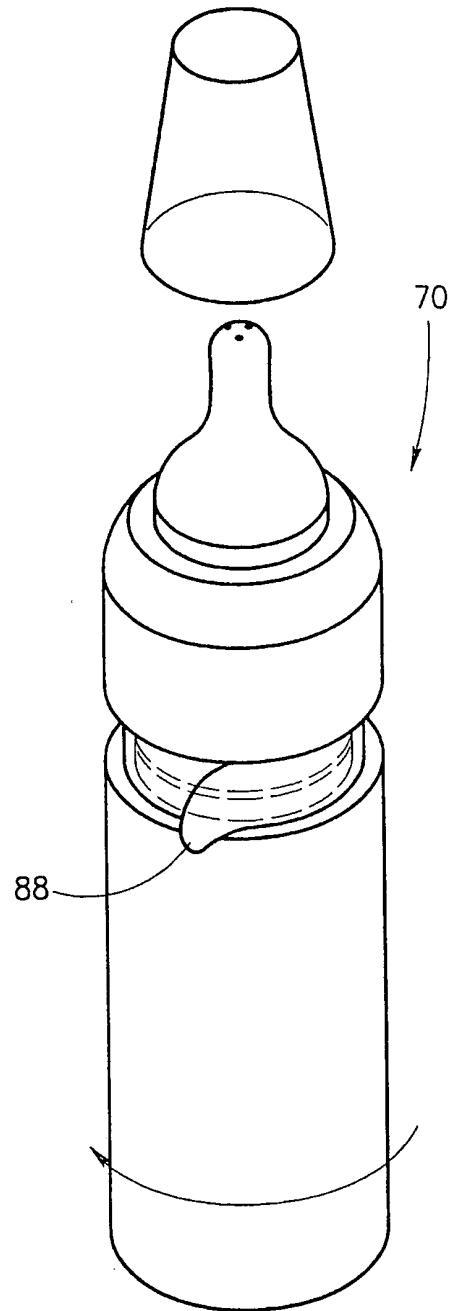
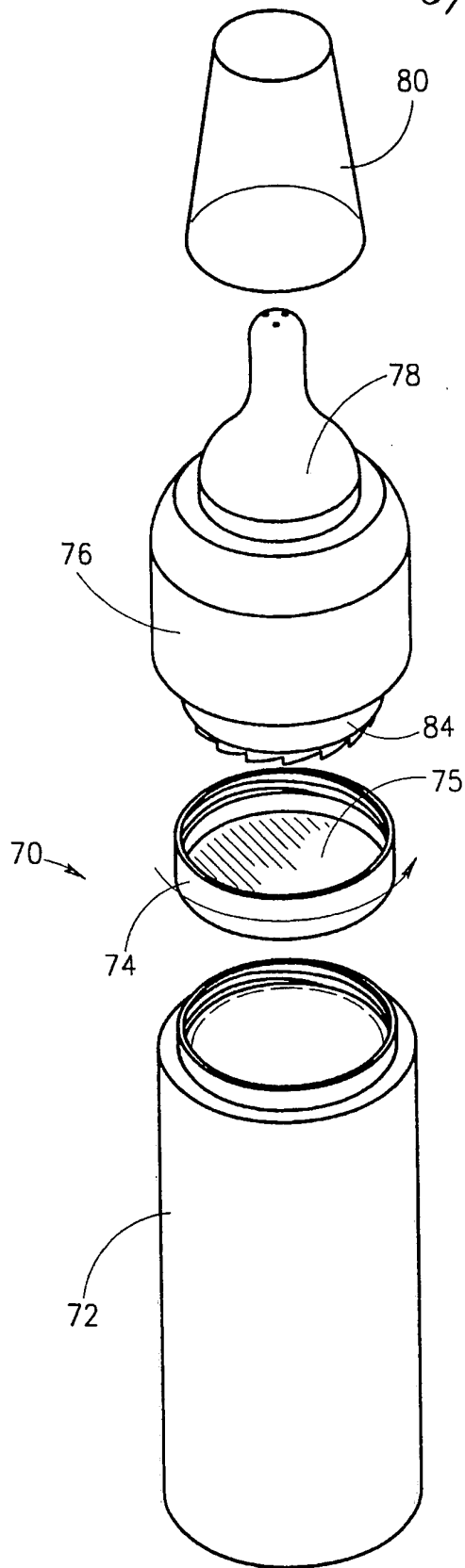


FIG. 7

FIG. 6

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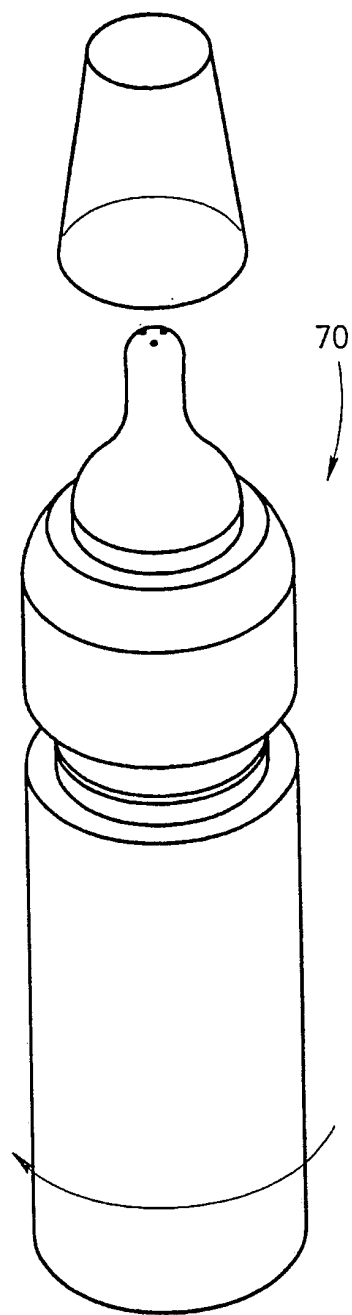
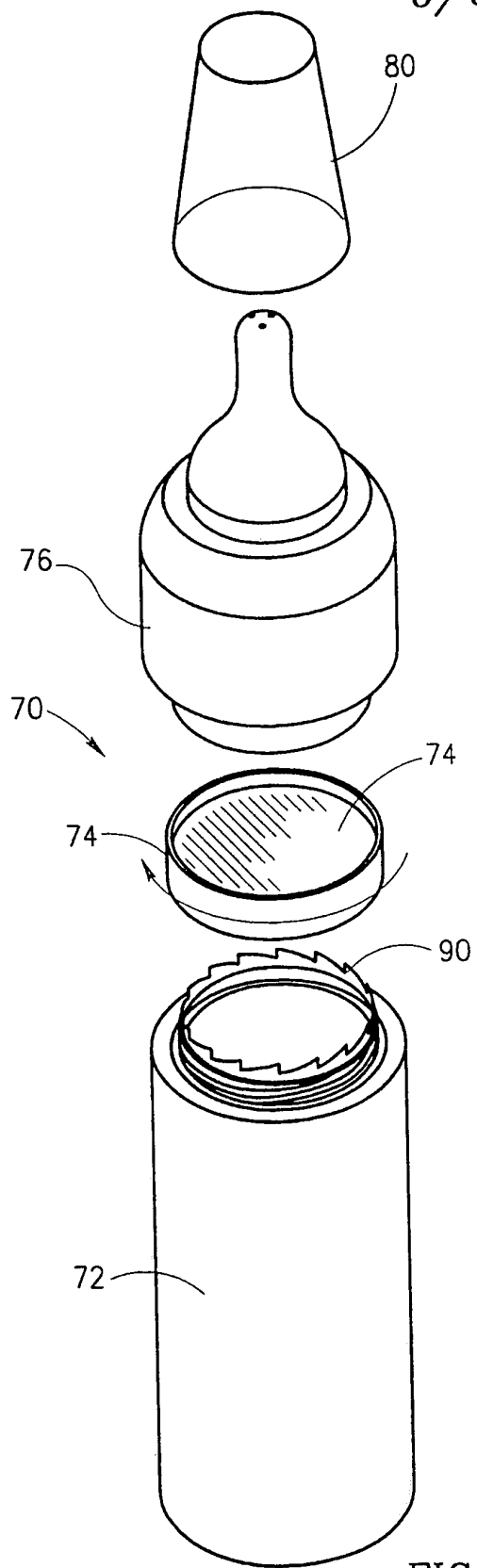


FIG. 9

FIG. 8

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IL 97/00322

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65D25/08 B65D81/32 A61J9/00 A61J1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B65D A61J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 298 180 A (CAMPBELL ALEXANDER LOCKEY) 28 August 1996 see page 5, line 5 - page 5, line 24 see figures 3-5	1,3
A	---	2
A	US 4 836 370 A (BOSSHARD ALEXANDER) 6 June 1989 see column 6, line 44 - column 7, line 8 see figures 9A-9C	2
A	US 3 290 017 A (DAVIES ET AL) 6 December 1966 see column 2, line 8 - column 2, line 53 see figures 1,2	2

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

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Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 251 193 A (BRISTOL MYERS CO) 7 January 1988 see page 3, column 4, line 24 - page 5, column 7, line 51 see figures 1-7 ---	4-7
X	US 3 220 588 A (LIPARI) 30 November 1965 see column 2, line 68 - column 3, line 14 see figures 1-4 ---	4,7
X	US 5 170 888 A (GONCALVES ANTONIN) 15 December 1992 see column 1, line 37 - column 2, line 31 -----	4

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IL 97/00322

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